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Hydrology and Earth System Sciences
Discussions
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Interactive comment on "Trends and abrupt changes in 104-years of ice cover and water temperature in a dimictic lake in response to air temperature, wind speed, and water clarity drivers" *by* M. R. Magee et al.

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Reviewer 2: Dr. Roman Zurek The authors would like to thank Dr. Roman Zurek for carefully reading the manuscript and providing thoughtful and helpful comments. We have revised the manuscript accordingly and detailed these changes in the point-by-point response below.

ScientiïňĄc signiïňĄcance: Does the manuscript represent a substantial contribution to scientiïňĄc progress within the scope of Hydrology and Earth System Sciences (substantial new concepts, ideas, methods, or data)? Yes ScientiïňĄc quality: Are

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Discussion paper

the scientiïňĄc approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)? Yes Presentation quality: Are the scientiïňĄc results and conclusions presented in a clear, concise, and well-structured way (number and quality of ïňĄgures/tables, appropriate use of English language)? Yes 1. Does the paper address relevant scientiïňĄc questions within the scope of HESS? yes 2. Does the paper present novel concepts, ideas, tools, or data? Yes it concern concept and realization 3. Are substantial conclusions reached? Yes 4. Are the scientiïňĄc methods and assumptions valid and clearly outlined? Yes, very clear 5. Are the results sufficient to support the interpretations and conclusions? Yes 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution Yes 8. Does the title clearly reïňĆect the contents of the paper? Yes 9. Does the abstract provide a concise and complete summary? Yes 10. Is the overall presentation well structured and clear? Yes, perfect 11. Is the language ïňĆuent and precise? Yes 12. Are mathematical formulae, symbols, abbreviations, and units correctly deïňĄned and used? Yes 13. Should any parts of the paper (text, formulae, ïňĄgures, tables) be clariïňĄed, reduced, combined, or eliminated? Generally is OK, however see comment 14. Are the number and quality of references appropriate? Yes 15. Is the amount and quality of supplementary material appropriate? Yes

We appreciate the positive comments assessed by Dr. Roman Zurek. We address the specific comments raised by the reviewer to improve the quality of the manuscript.

General comments. To some extent, the discussion develops the chapter "results" and is focused on the examined lakes. In my subjective opinion lack of comparison with similar studies in lakes from another part of the world. I suggest to compare with European lakes with similar latitude For example: Skowron R. 2009. Changeability of the ice cover on the lakes of north- ern Poland in the light of climatic changes. Bull Geogr,

1,: 103–124 http://apcz.pl/czasopisma/index.php/BOGPGS/article/viewFile/2312/2296

Marszelewski W., Skowron R. 2006. Ice cover as an indicator of winter air temperature changes case study of the Polish lowland lakes. Hydrol. Sci. J. 41, 336-349 http://www.tandfonline.com/doi/pdf/10.1623/hysj.51.2.336

Choi′nski, A., L. Kolendowicz, J. Pociask-Karteczka, et al., 2010: Changes in lake ice cover on the Morskie Oko Lake in Poland (1971ï ËŸA 2007). Adv. Clim. Change Res., 1, doi: 10.3724/SP.J.1248.2010.00071.

Choi′nski A., Ptak M., Strzelczak A. 2013. Areal Variation In Ice Cover Thickness On Lake Morskie Oko (Tatra Mountains). Carpathian Journal of Earth and Environmental Sciences, 8, 3, 97 -102 https://www.researchgate.net/publication/263733557_Areal_variation_in_ice_cover_thickness_on_lake_morskie_oko_Tatr

We have included these references, of which we were previously unaware. Many thanks for providing the references. We have incorporated comparisons to the earlier studies in European lakes where appropriate in the text.

Pg 14, L7-10: "These results are much smaller than those for European lakes of similar latitudes (Choiński et al., 2010, 2013; Marszelewski and Skowron, 2006; Skowron, 2009), with changes ranges from 0.20 to 0.60 cm yr-1, almost double that of Lake Mendota if the current change per year is extended to change per century."

Pg 15, L8-16: "Similar tendencies have been observed at other lakes, which show decreasing ice cover duration from later ice on dates and earlier ice off dates (Choiński et al., 2010, 2013; Marszelewski and Skowron, 2006; Skowron, 2009). However, lakes in near the Great Lakes, North America and Poland have shown larger rates of change over periods of less than a century. For example, Jensen et al. (2007) observed average ice duration decreases of 5.3 days decade-1 from 1975-2004 in the Great Lakes Region, and Polish lakes had observed changes as large as 0.8 to 0.9 days year-1 for the peirod 1961-2000 (Marszelewski and Skowron, 2006) and 0.5 to 0.6

days year-1 from 1956-2005 (Skowron, 2009)."

Pg 23, L14-16: "Similarly, lakes in Poland show a considerable statistical relationship between ice cover and the North Atlantic Oscillation winter indexes (Skowron, 2009), indicating that ice cover may be driven by other large oscillations as well."

Technical notes Page 2, Line 11 insert space , 1994 which This change has been made

Page 9 line 7 : correct The spacing issue has been corrected.

Page 11, line 15. is: trend of .224, should be 0.334 We have corrected this on Page 12 – Line 11

Fig 2 I suggest to use ïňĄlled triangle for snow, will be better visible We have made this change in Figure 2 as suggested.

Page 3, line 13 is Jiang et al. 2010 We change to Jiang et al. 2009 Page 3 line 32, Stefan et al 1996, lack in references Reference has been added on Page 35 Line 10-13.

Page 4 line 3 and 8 is Schindler et al 1996 lack in ref. Reference has been added on Page 34 Line 27-30.

Page 5 line 17, is Patterson 1981 lack in ref. Reference has been added on Page 33 Line 13-14.

Page 6 line 1 is McKay, 1968 in references lack year 1968 Reference has been added on Page 32 Line 37-38.

Page 8 line 10, Rodinov 2006 lack of year in references Reference has been added on Page 34 Line 9-10.

Page 8 line 16 is Kitchell 1992 im Litereture is Kitchell 2012 The year has been changed to 2012.

Page 9 line 20, is Lathrop et al 1996 in teferences is 1998 The reference has been

changed to 1996. See page 32 Line 6

Page 18 line 3, is Lathrop et al. 1996, in literat. Is Lathrop et al 1998 The reference has been changed to 1996. See page 32 Line 6

Page 23 line 13 Stauffer and Armstrong 1986 m in references lack of year The year has been added.

Page 23 kune 15 is Lee1973 insert space Inert the space

Page 23 line 18, is Rice 2015 lack in references ther is Rice et al 2014 Change to 2015 see Page 33, Line 32

Page 23 kine 23, is Carpanter et al 2007 lack in references It should be Carpenter et al. 1992.

Table 2 footnote Lathrop et al 1996 lack in references The reference has been added on Page 32 Line 4-6.

Over-abound , in excess Revised.

Lathrop & Carpenter 2011Not cited, Malm et al 1997 not cited in the text, Rodionov 2005 All are removed from the references.

Thank you to the reviewer for pointing out these errors in references and citations. All the above errors in references have been corrected accordingly. Furthermore, we have reviewed the reference list carefully to update other missing or improperly formatted references in the text and reference list.

Links to websites move to footnote The author guidelines for this journal specify that the use of footnotes should be avoided as much as possible. As result, we keep them in the text in an effort to conform to the journal guidelines.

Remarks to ïňĄgures Fig. 2. use line 0.1-0.3 mm, not hairy, Snow symbol (triangle) ïňĄll.. Will be visible. We have changed the fill on the triangle representing snow

thickness to make the symbols more visible.

Fig 4.line use to open circles not hairy, minimum 0.1 to 0.3 mm We have changed the thickness of the lines on the charts to make them more legible.

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